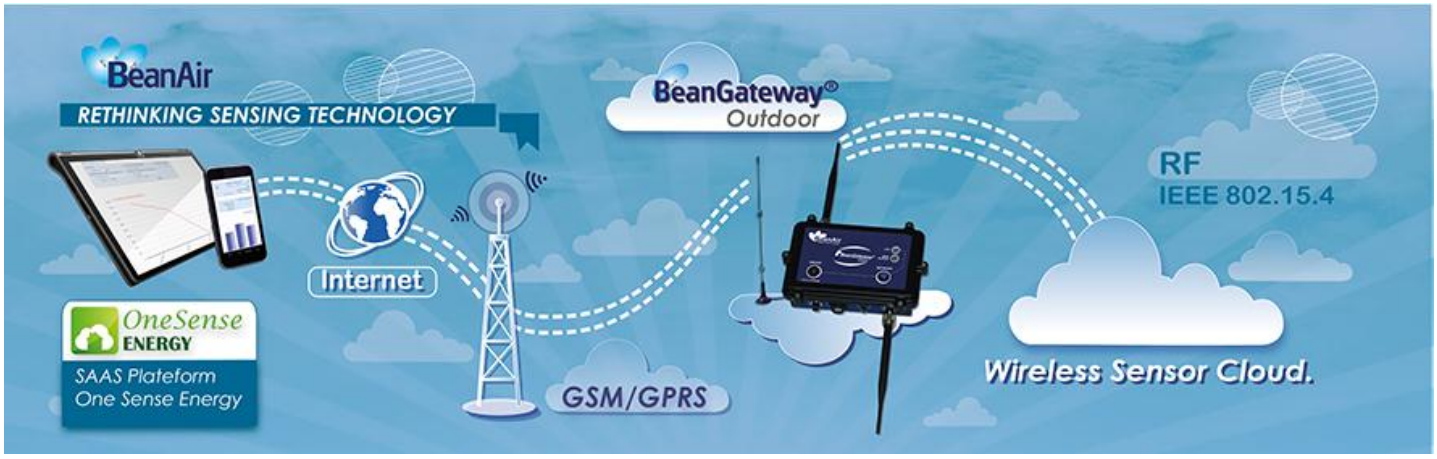
Wireless sensor networks (WSN) coordinator- IEEE 802.15.4 & GSM/GPRS-Outdoor & Rugged Version



Technical Note

TN_RF_009 – « BeanGateway® management on LAN infrastructure »

- **Wireless technology IEEE 802.15.4 coming with antenna diversity**
- **Ethernet/LAN interface with a server**
- **Advanced *UPS* (Uninterruptible power supply) with integrated rechargeable Lithium battery**
- **Data logger based on Micro-SD® (option)**
- **Watertight (IP67) & Robust Aluminum Enclosure**
- **GPRS Remote transmission**

Powered by OneSense ENERGY

Featured video

Click here to see the video of the BeanGateway® (Outdoor version)

MADE IN FRANCE

Applications

- Outdoor isolated sites (solar & wind energy farm, water/gas pipeline, mountains, water power plant …)
- WSN in Harsh Industrial Environment

Main features

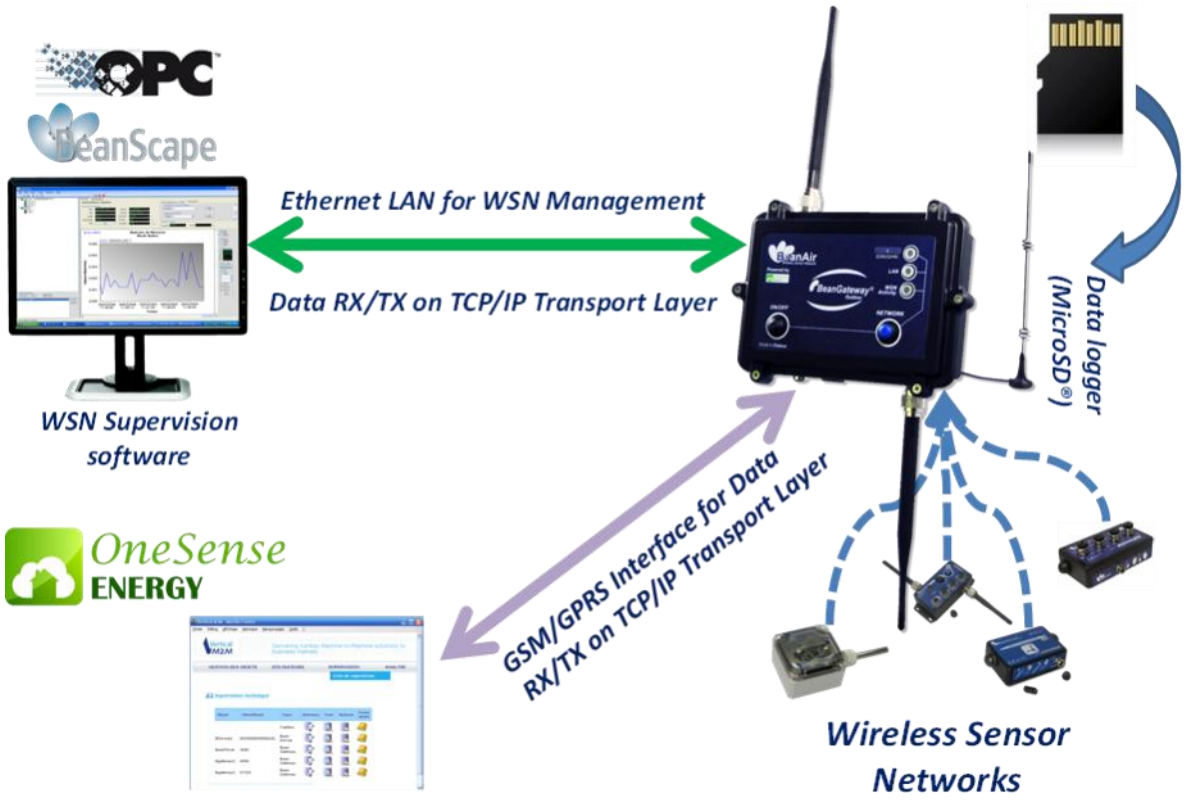
- Builds and manages **Beanair®** Wireless Sensor Network (WSN)
- Wireless protocol stack : **IEEE 802.15.4**
- Link protocol with a server: TCP/IP/UDP/DNS/DHCP
- GSM/GPRS remote transmission
- Maximum Radio range : 1 km (L.O.S.)
- Embedded WSN Diagnostic tool
- Advanced ***UPS*** (Uninterruptible power supply) with integrated rechargeable Lithium battery
- Watertight (IP67) & Robust Aluminum Enclosure
- WSN mapping & context is stored on embedded flash
- **« Plug & Play »** installation : no knowledge regarding wireless network is necessary
- Embedded files system for logging all the wireless sensors measurement (backup on **Micro-SD®**)
- Standard interface with our WSN Scada supervision software ***BeanScape®*** or our webserver

OneSense ENERGY

A multi-protocol WSN Coordinator

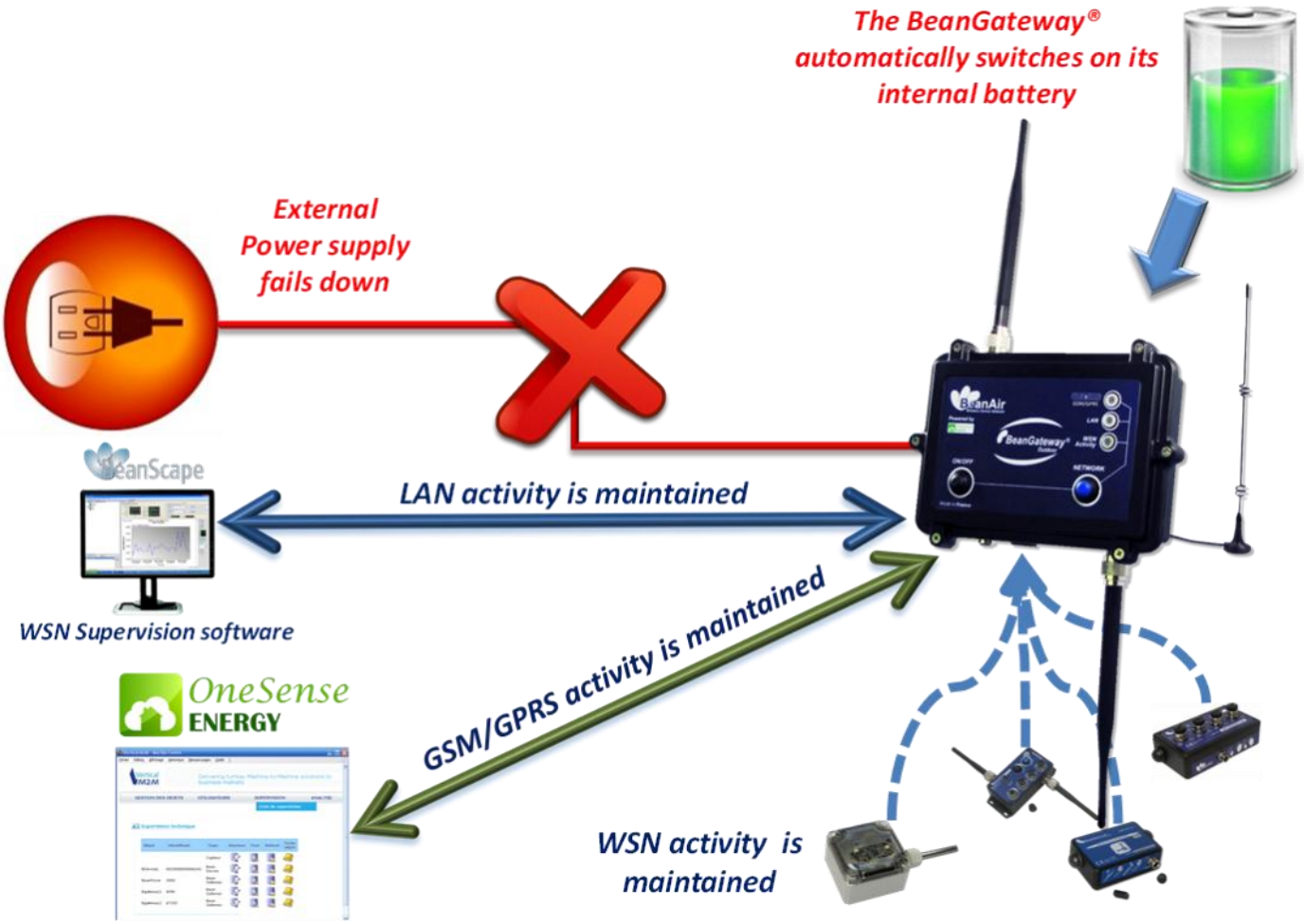
The ***BeanGateway® GSM/GPRS*** is used to build and manage Beanair® wireless sensor network. It can manage queues for every network element (***BeanDevice®***). As a gateway, it controls the external access to the network through a highly secured authentication procedure. It supports the conversion of data exchanged, compression and IP connectivity with the network thereby reducing the intelligence required in these platforms, maintenance and therefore the associated cost.

The ***BeanGateway® GSM/GPRS*** is also equipped with various communication interfaces with the customers IT infrastructure (Ethernet - TCP / IP / UDP / DHCP / DNS & GSM/GPRS). With a client application TCP / IP, it can easily connect to a local application server (via the Ethernet) or a distant application server (OneSense® Energy).

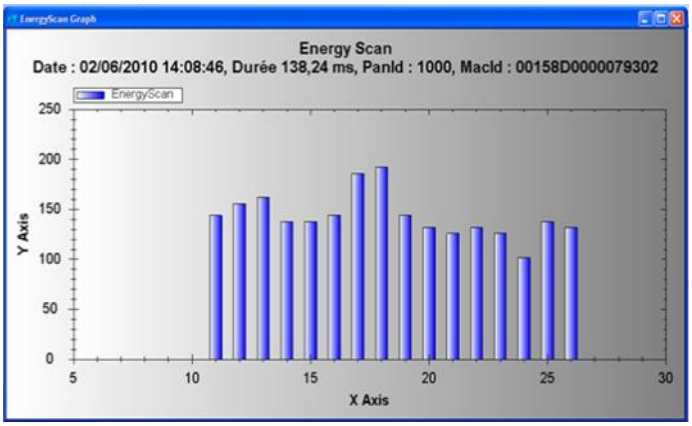


Advanced uninterruptible power supply (UPS)

The ***BeanGateway® GSM/GPRS*** operates with an external power supply (DC 8-28V). An integrated rechargeable battery with a capacity of 950mAh is used as an UPS battery (uninterruptible power supply). The internal battery provides instantaneous protection from external power supply interruptions, the wireless sensor network activity & Ethernet LAN activity are preserved during this time (3h00 to 3h30 approximately).



Embedded WSN diagnostic tool

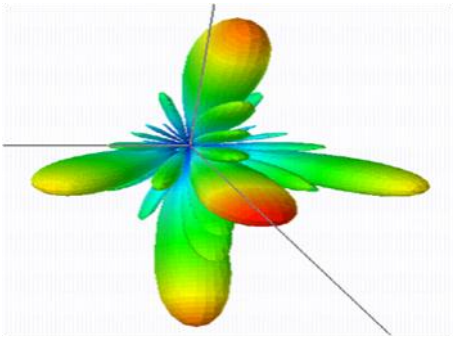


The ***BeanGateway® GSM/GPRS*** provides a WSN diagnostic tool useful for resolving some common networking troubleshooting:

- **Energy Scan** for choosing the more appropriate RF Channel
- ***BeanDevice®* PER (Packet Error Rate)** calculation
- **LQI (Link Quality Indicator)** between the ***BeanGateway® GSM/GPRS*** and the ***BeanDevice®***

The Energy Scan allows the user to know the network quality on each Radio channel. This operation allows the user to choose the appropriate RF channel on a site where the WSN is deployed.

Antenna diversity



While the vast majority of wireless sensors shows their limits in harsh industrial environment, the **BeanGateway® GSM/GPRS** integrates an innovative antenna diversity design, allowing to optimize the radio link quality in environments subject to random and diverse disturbance. Antenna diversity improves both the quality and reliability of a wireless link by 30%.

Autonomous and smart

The ***BeanGateway® GSM/GPRS*** has the capability to backup the WSN mapping & context. Thus the user can operate the WSN without any use of PC or IT server. All the data measurements are stored on an external Memory (Micro-SD® card) .

OneSense ENERGY

A high grade versatile and affordable energy performance monitoring and management solution.

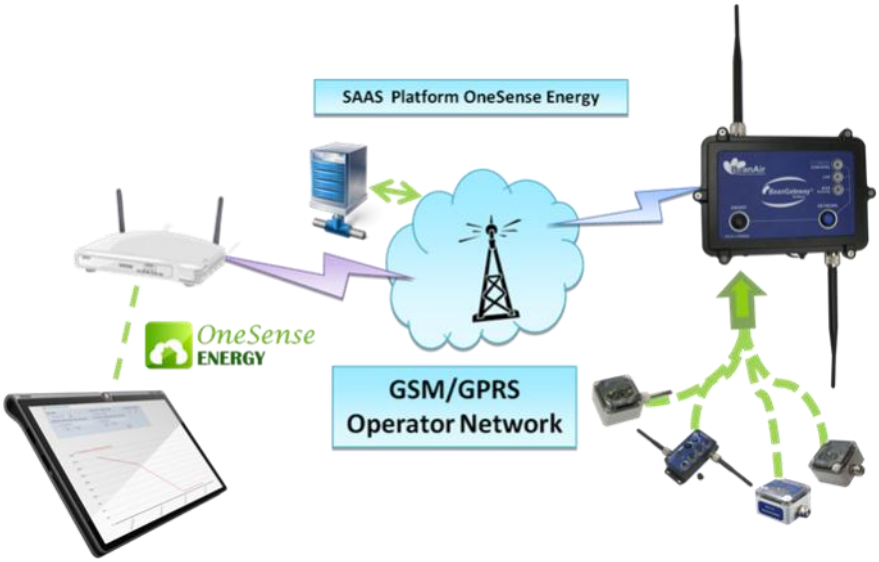
www.onesen.se

Remote transmission via GPRS

All the data measurement can be transmitted via GPRS to a web server application ***OneSense® Energy*** to be viewed remotely. The user can thus remotely monitor energy performance.

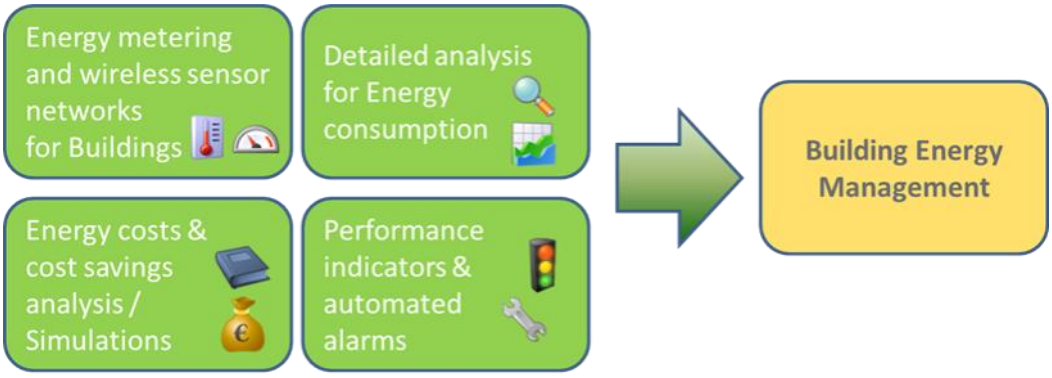
Operating principles

Our software service platform ***OneSense® Energy*** through a multi-user, multilingual, multi-tenant and multi-service framework enables you to rely on a powerful solution for the follow-up and monitoring of sites with regard to energy management and energy performance monitoring needs. This is your first step towards your Smartgrid approach.



Key features

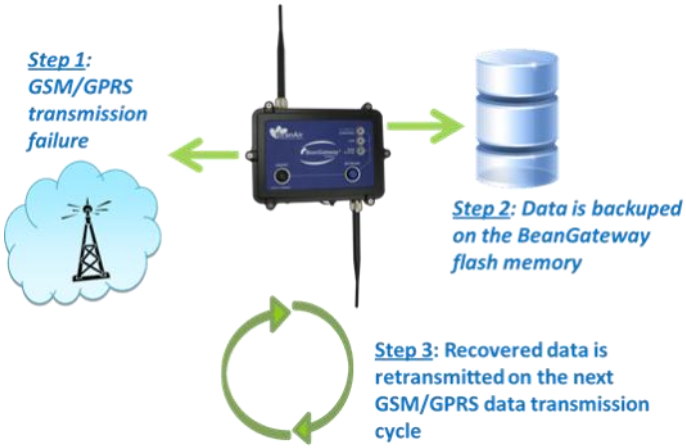
- Multi-level Architecture : your application supports multiple levels of management and related user profiles going from facility managers to end-users;
- A native park and building management solution : group and site management view, consolidated views;
- Open service platform, enabling integration of various heterogeneous data sources for analysis;
- Efficient, easy to use and exploit "Web-based " Solution;
- Innovative Wireless Sensor Network solution;
- Built-in Technical Supervision for all devices used for telemetry and energy metering (device status, network car-tography, etc) making maintenance easier and granting superior quality of service;
- Real-time follow-up of Energy consumption and expenses.


Energy metering and wireless sensor networks for Buildings
Detailed analysis for Energy consumption
Energy costs & cost savings analysis / Simulations
Performance indicators & automated alarms
Building Energy Management

Store and forward function

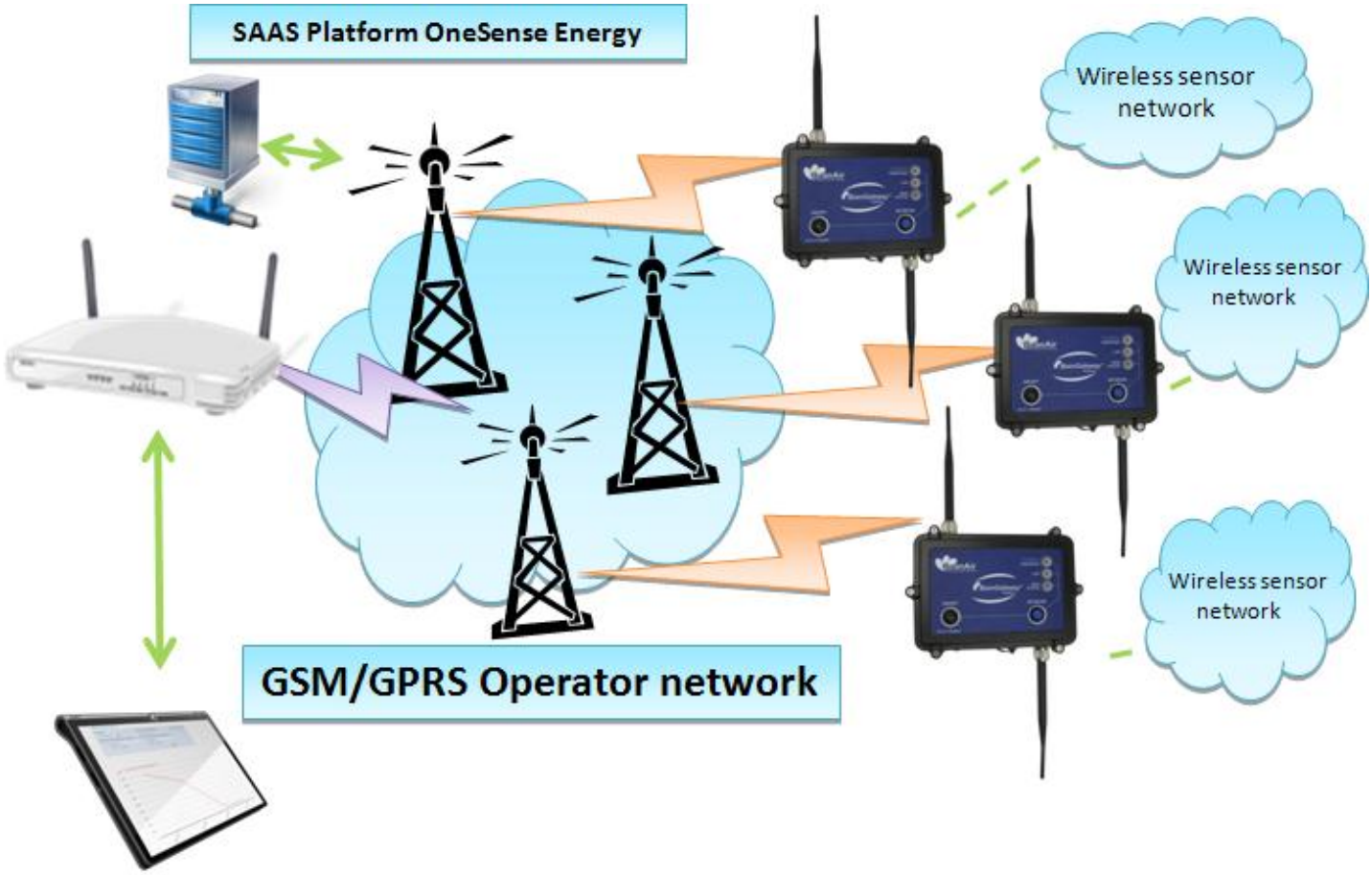
« ***Store and Forward*** » is a telecommunication technique used on the BeanGateway®, allowing to backup temporally all the data on the BeanGateway® memory flash :

- In case of GSM/GPRS network failure, measurement data are backuped on the BeanGateway® flash memory and then retransmitted on the next GPRS transmission cycle ;
- Data is transmitted by packet, thereby GPRS data communication cost is decreased;


Step 1: GSM/GPRS transmission failure
Step 2: Data is backuped on the BeanGateway flash memory
Step 3: Recovered data is retransmitted on the next GSM/GPRS data transmission cycle

Multi-sites management

OneSense® energy can manage several WSN (Wireless Sensor Networks), each site is recognized by the BeanGateway® MAC ID and the Network PAN ID (Personal Area Network).



Product reference
BGTW-GPRS-OUT

Specifications	Wireless Sensor Network Coordinator
Wireless Stack	IEEE 802.15.4
WSN Topology	**IEEE 802.15.4** Peer-to-peer/ Star
Antenna Diversity	Self-managed antenna diversity function
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels
RF Transmit power	Configurable transmit power: +0,5 dBm to +20 dBm
Receiver sensitivity	-95,5 dBm to -101 dBm
Encryption	AES 128 bits (integrated AES coprocessor)
Maximum Radio Range	1 km (L.O.S.)
WSN Diagnostic tool	· Energy Scan for choosing a suitable RF Channel · BeanDevice® PER (Packet Error Rate) calculation · LQI (Link Quality Indicator) between the BeanGateway® GSM/GPRS and the Bean-Device® · RF channels Blacklist

Specifications	Ethernet/LAN Network
Network/Transport Protocol	Client TCP/IP, UDP, DNS, DHCP
Data Link Protocol	Ethernet / Fast-Ethernet with auto-uplink (MDI/MDI-X auto) - IEEE 802.3x
IP Addressing	Dynamic (DHCP) or static
IP configuration	LAN parameters (DNS, DHCP, Keep Alive…) are configurable from the BeanScape® (RS232 Interface or UDP/Ethernet Interface).

Specifications	Physical & Environmental
Dimensions (L x l x h)	202 mm x142 mm x 55 mm
Enclosure/Finish	· Aluminium alloy ADC12 black finish · Wall mounting holes (outside the sealing area)
IP Ratings	IP67
Weight	1220g
Connectors	· Power supply connector: M8-3P female socket, Ratings IP67, Contact brass with gold plated · Ethernet connector : RJ45 Female, Ratings IP67, Contact copper alloy with gold plated · Antenna connector: N-Type female, Ratings IP67 · ON/OFF push button : Latching push-button, Ratings IP67 · Network context push button: momentary push-button, Ratings IP67
Operating temperature	-20 °C to +75 °C – with Integrated internal temperature sensor (resolution 0.125°C)
Norms	CE Labeling directive R&TTE (Radio) , ETSI EN 300 328 , ROHS - Directive 2002/95/EC, FCC Part 15

Specifications	GSM/GPRS Features
GPRS	GPRS Class 10
Network/Transp. Protocol	Client TCP/IP, UDP, DNS, DHCP
Frequency band	Quad-band EGSM: 850 / 900 / 1800 / 1900 MHz
Sensitivity	-107 dBm @ 850 / 900 MHz -106 dBm @ 1800 / 1900 MHz
SIM Card configuration	Secured configuration from the BeanScape® : · PIN Code · Acces Point Name (APN) · Login & Password · IP Address & Destination Port
Output power	Class 4 (2W) @ 850 / 900 MHz Class 1 (1W) @ 1800 / 1900 MHz
Store & Forward function	· 16 Mbits Flash Memory for temporary data storage · Configurable GSM/GPRS Transmission cycle

Specifications	Power
Power Consumption	250 mA to 300 mA during wireless RX/TX and Ethernet activated
External power supply	+9V to +28 V , integrated Lithium-Ion battery charger with high-precision battery monitoring
Integrated Lithium-Ion Battery	Lithium-Ion rechargeable battery 950 mAh (reference BAT0.95DMG) In case of external power supply failure, the BeanGateway® can switch on the internal battery.

Specifications	Accessories
2.4 GHz Antennas	Two antennas : · High gain antenna 5,5 dBi · V.S.W.R : 1.5 :1 · Connector : N-Type (Watertight)
GSM/GPRS Antenna	· Frequency: 850-1900/900-1800 MHz · V.S.W.R : 1.5 :1 · Gain : 3dBi · Mounting : magnetic · Cable length: 2 meters
Ethernet Cable	· RJ45 Male waterproof connector (casing side only) · Cable length: 3 meters
Wall plug-in power supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A
Connectors cap	M8-3P cap

Specifications	Options
Embedded File System on Micro-SD®	All the User data are stored on an external memory (Micro-SD® technology): · Measurement storage for Wireless Sensor Network (network configuration, measurement, alarms notifications …) ; · Maximum storage capacity (2Go) · CSV files management (for exporting data on Excel® and Access®)

BeanAir
sales@beanair.com
Tel.:+33.(0)1.83.62.16.38
Fax : +33.(0)9.72.32.56.28
www.beanair.com

Watch our featured videos on Youtube